

CLMPTO

09/28/04

CM.

**1. A method for manufacturing a ferroelectric capacitor comprising the steps of:**

**forming a substructure of the capacitor having a contact plug passing therethrough for electrically connecting a bottom electrode of the capacitor to an underlying active layer;**

**depositing over the substructure the bottom electrode including a barrier layer intermediate therebetween;**

**depositing over the bottom electrode a ferroelectric layer such that the diffusion of contaminants from the ferroelectric layer to the contact plug is inhibited by the intermediate barrier layer;**

**depositing over the ferroelectric layer a top electrode;**

**depositing over the top electrode, the underlying ferroelectric layer and the bottom electrode a first hardmask;**

**etching to pattern the top electrode using the first hardmask;**

**depositing over the remaining portions of the first hardmask and on the bottom electrode an additional hardmask;**

etching to pattern the bottom electrode using a first recipe resulting in the formation of a first fence clinging to sidewalls of the additional hardmask, bottom electrode and barrier layer; and

etching the intermediate barrier layer using a second recipe resulting in the formation of a second fence clinging to and structurally supported by the first fence while at the same time etching away a substantial portion of the first fence to remove the structural support provided to the second fence so that the second fence is lifted-off from the sidewalls leaving the sidewalls substantially free of clinging fences.

2. The method of Claim 1 wherein the intermediate barrier layer has a composition including Iridium.
3. The method of Claim 2, wherein 30% to 90% of the barrier layer not protected by the additional hardmask is removed during the etching using the first recipe.
4. The method of Claim 1, wherein the etching of the intermediate barrier layer using the second recipe continues until portions of the substructure are also etched.

5. The method of Claim 1, wherein the additional hardmask is tapered at an angle steeper than 60 degrees.
6. The method of Claim 1, wherein the contaminants include oxygen.
7. The method of Claim 1, wherein the first recipe is a fluorine-based recipe.
8. The method of Claim 1, wherein the second recipe is a CO-based recipe.
9. The method of Claim 1, wherein the additional hardmask is formed from TEOS.

CLAIMS 10-14. (CANCELLED)